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Ecological survey on chaetophorales of two ponds (Old & New) at Shahdol (M.P.), India

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Abstract

Physico chemical studies of two ponds (Old & New) water at Shahdol showed that Chaetophorales were nearly absent in impure water. *Stigeoclonium nanum* flourished well solely in impure water and appeared as biological indicator of pollution. *Stigeoclonium farctum* and *Pseudulvella americana* var. *indica* were found in each impure and fewer impure ponds indicating that they were pollution tolerant. Their variety declined within the impure pool. This protocist happens profusely in fresh water being connected to some stratum ideally to submerged plant elements exhibiting a jellylike macroscopic growth

Keywords: ecological, chaetophorales, polluted water, fresh water ponds

Introduction

Chaetophorean algae are heterotrichous in habit frequently bearing terminal or lateral hair-like projections. In their heterotrichy both the erect and prostrate portions of the plant may be well developed (e.g., *Stigeoclonium*) or with an elaborate erect portion and feebly developed prostrate portion.

Cells are with thin to gelatinous walls, usually uninucleate having a single more or less dissected plate-like or ring-like chromatophore with pyrenoids. Asexual reproduction is by biflagellate or quadriflagellate zoospores and sexual reproduction isogamous.

Studies on the ecology of Chaetophorales inhabiting Indian landmass in aquatic surroundings are scanty. (Lund, 1965; Kamat, 1981; Ramaswamy and Somasekhar, 1982; Prasad and Singh, 1982; and Sahai *et al.*, 1985) [1, 5]. An attempt was made to study the ecology of all the members of Chaetophorales besides their morphology and taxonomy and some of these observations are reported in the present study.

Materials and Methods

The Shahdol district lies in the north-east part of Madhya Pradesh extending from 29°39'28" and 24°16'13" North latitude and from 80°32'56" to 82°12'21" East longitude approximately. The region lies in the heart of the country. The district is surrounded by Sone river and Rewa district in North, Mandla in South, Surguja and Bilaspur in East and Umaria and Katni in the West. It is situated 489 meter above the sea surface.

Occurrence of Chaetophorales members in two fresh water ponds of Shahdol is studied. Old pond is more polluted than New pond with reference to their ecology. The ponds differ widely in their water chemistry, because they attain different

types of effluents pond one received rain water, sewage canal water and run off from agricultural fields. New Pond received rain water, domestic effluent and discharge from small industries.

Water and algal samples were collected at monthly intervals from ponds. Water sample were kept in sterilised plastic containers and B.O.D. bottles. Chara, Hydrilla, Ceratophyllum and grasses were picked for collection of Chaetophorales. Water was analysed for Water temperature, Secchi transparency, Conductivity, TDS, pH, Free CO₂, Total CO₂, Total Alkalinity, Dissolved O₂, Chloride, Total Hardness, Sodium content, Potassium, Nitrates, Phosphate, Sulphate and Reactive silica. Identification was done mainly according to Nurul Islam (1963) [6], APHA (1964) [7], Tupa (1974) [8], Cox and Bold (1974) [9].

Results and Discussion

20 taxa of Chaetophorales belonging to 8 genera were collected during the present study (table 1). These were Aphanochaete, Chaetophora, Chaetosphaeridium, Coleochaete, Epibolium, Leptosiropsis, Pseudulvella and Stigeoclonium. In Old pond, which was more polluted blue green algae *Merismopedia* and *Microcystis* were dominant. In this pond, 3 green algae *Stigeoclonium nanum*, *Stigeoclonium farctum* and *Pseudulvella americana* var. *indica* were able to grow during September to November. *Stigeoclonium nanum* was collected during May to June. Comparison of physico chemical values of ponds showed that in New pond, calcium, magnesium, carbonates, chlorides, total alkalinity and total organic matter were significantly high, but dissolved oxygen was quite low (table 2).

Table 1: Comparison of Chaetophorean population at Old & New Ponds.

S. No.	Chaetophorean taxa	Old Pond	New Pond
1.	<i>Aphanochaete magna</i>	P	A
2.	<i>Aphanochaete repens</i>	P	A
3.	<i>Chaetophaeridium pringsheimii</i>	P	A
4.	<i>Chaetophora attenuata</i>	P	A
5.	<i>Chaetophora elegans</i>	P	A
6.	<i>Chaetophora pisiformis</i> var. <i>hamata</i>	P	A

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7.	<i>Coleochaete nitellarum</i>	P	A
8.	<i>Coleochaete pseudosoluta</i>	P	A
9.	<i>Coleochaete pulvinate var minor</i>	P	A
10.	<i>Coleochaete scutata var. minor</i>	P	A
11.	<i>Coleochaete soluta</i>	P	A
12.	<i>Coleochaete soluta var. minor</i>	P	A
13.	<i>Coleochaete sp.</i>	P	A
14.	<i>Epibolium polysporum</i>	P	A
15.	<i>Leptosiropsis torulosa</i>	P	A
16.	<i>Pseudovella americana var. indica</i>	P	P
17.	<i>Stigeoclonium farctum</i>	P	P
18.	<i>Stigeoclonium nanum</i>	A	P
19.	<i>Stigeoclonium nudiusculum</i>	P	A
20.	<i>Stigeoclonium sp.</i>	P	A

Table 2: Annual range of physico-chemical parameters at Old and New ponds.

S. No.	Parameters	Old Pond			New Pond		
		Min.	Max.	Avg.	Min.	Max.	Avg.
1.	Water temperature (°C)	18.84	25.96	22.40	19.92	26.98	23.45
2.	Secchi transparency (cm.)	26.78	67.66	47.22	27.72	68.62	48.17
3.	Conductivity (µmhos/cm.)	309.24	383.04	346.14	308.25	382.24	345.25
4.	TDS (mg/l)	115.02	133.12	124.07	114.12	132.22	123.17
5.	pH	7.02	8.11	7.57	7.32	8.08	7.70
6.	Free CO ₂ (Mg/l)	0.38	1.18	0.78	1.08	1.76	1.42
7.	Total CO ₂ (Mg/l)	105.08	122.07	113.58	98.08	112.06	105.07
8.	Total Alkalinity (Mg/L)	115.14	143.18	129.16	114.12	142.08	128.10
9.	Dissolved O ₂ (Mg/L)	7.42	8.53	7.98	7.54	8.66	8.10
10.	Chloride (Mg/l)	30.04	38.12	34.08	31.54	50.02	40.78
11.	Total Hardness (Mg/l)	160.48	182.16	171.32	162.18	191.14	176.66
12.	Sodium content (Mg/l)	5.06	7.16	6.11	4.76	7.36	6.06
13.	Potassium (Mg/l)	1.08	1.65	1.37	1.38	2.05	1.72
14.	Nitrates (Mg/l)	0.081	0.186	0.13	0.032	0.084	0.06
15.	Phosphate (Mg/l)	0.04	0.06	0.05	0.03	0.05	0.04
16.	Sulphate (Mg/l)	0.41	1.58	1.00	0.48	1.6	1.04
17.	Reactive silica (Mg/l)	2.17	2.42	2.30	2.16	2.56	2.36

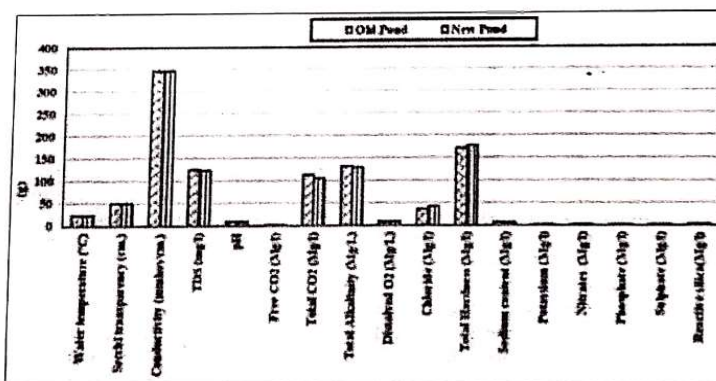


Fig 1: Graphics analysis of Average growth of physico-chemical parameters at Old and New ponds.

The remarkable difference in the physico-chemical characters may be reason for reduced incidence of green algae Chaetophorales. In New pond out of 3 Chaetophoralean species, *Stigeoclonium nanum* facilities and encouragements.

Appeared as new biological indicator of water pollution. *Stigeoclonium tenue* was reported as bio-indicator of water pollution (Palmer, 1963; Mclean, 1974; Mclean and Benson, 1974; Rai 1978) [10, 13]. *Stigeoclonium nanum* possessed pseudoparanchymatous prostrate system in comparison to *Stigeoclonium tenue*. Chaetophorales in general do not

inhabit polluted habited. Some of them like *Stigeoclonium tenue* and *Stigeoclonium nanum* are very well adapted to polluted environment and can be regarded as bio-indicators of pollution.

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